2021

Progress

Georgia Southern University

Progress

GEORGIA SOUTHERN UNIVERSITY
ALLEN E. PAULSON COLLEGE OF ENGINEERING AND COMPUTING

Welcome to the new online version of *Progress*, the magazine of the Allen E. Paulson College of Engineering and Computing. We are approaching 10,000 subscribers, and as we ***are*** the College of Engineering and Computing, we think online is the way to go! This issue features three of our first female engineering graduates, a recent student success story, two of our pre-eminent female faculty, as well as one of our most influential female industry/business collaborations. Welcome to the **Women of Engineering and Computing** issue of *Progress*!

About the College
Curriculum
Faculty & Staff
Students
Giving

Apply Now

Apply Undergraduate

Apply Graduate

Welcome to the New Magazine!

March 17, 2021

Welcome to the first digital issue of Progress. I am especially excited that this issue is focusing on the Women in the fields of Engineering and Computing, and being published during Women's History Month.

You may not know that for the past couple of years, Georgia Southern has been making inclusive excellence a high priority, and it is a cornerstone of the University's and the College's Strategic Plans. The University has appointed Dr. TaJuan Wilson as Associate Vice President for Inclusive Excellence and Chief Diversity Officer, and he is working with each college and unit to strengthen and celebrate cultural diversity across all three campuses.

The Paulson College of Engineering & Computing was the first to offer inclusive excellence training for its faculty search committees, and our Diversity Council is busy developing its own by-laws and strategic plan under the leadership of Dr. Celine Manoosingh, associate professor of Civil Engineering and Construction. We encourage our alumni, current and prospective students, parents, friends, industry, and corporate partners to help as we recruit, maintain, and celebrate a diverse student and faculty population. In the case of the fields of engineering and computing, this means recruitments of more women, African Americans, Latinx, and Native Americans. This endeavor is competitive and requires enhanced resources in

support of our faculty's and students' academic scholarship.

I always encourage you to become involved with the College, because I am always excited, amazed, and enthusiastic about the great things our students and faculty are doing. Although the pandemic has curtailed so much, we have also expanded our ways of coming together, which will enable even those of you from across the country to participate in advisory committees, job fairs, our annual Student Research Symposium, or Industry Expo, and many more activities.

Bookmark the Paulson College of Engineering & Computing website now or follow us on Twitter (@GS_CEC), Facebook (@GSCEC), or LinkedIn to stay involved.

Sincerely,
Mohammad Davoud
Founding Dean

Student Success – Gracia Dardano, BS MechE ’20

March 17, 2021

Gracia Dardano hanging out with friends in N95 masks

In her final semester as a senior Mechanical Engineering major at Georgia Southern, Gracia Dardano Castro was not only taking 16 credit hours of courses, she was also interviewing for jobs, serving as team leader for the Senior Design Class Project for Mechanical Engineering, tutoring, writing a thesis for the 2021 Student Research Symposium on N95 mask filtration (more on that later), and preparing to participate in the ASME Virtual CAD Design Competition with the Georgia Southern ASME student chapter.

Dardano was President of the ASME student chapter last year (2019- 20). Dr. Brian Vlcek, chair of the Department of Mechanical Engineering, is the faculty advisor for the Georgia Southern chapter, and Dardano credits Vlcek with putting her in leadership positions. Through ASME, she has participated in two other competitions, one on NASA, with mentorship from Dr. Marcel Ilie, and one on Robotics, with mentorship from Dr. Junghun Choi. “Their

guidance really helped both teams immensely in competition” Dardano said appreciatively.

In her spare time (!), Dardano works out, reads, watches TV and hangs out with friends. By the way, she graduated with a 3.99 cumulative GPA. Shortly after graduating, Dardano landed her dream job with Tesla Corporation. She is now an Associate Manufacturing Engineer in their Cell Battery Engineering Department in their new facility in Austin, Texas.

Dardano grew up in San Salvador, capital of El Salvador, in a family of lawyers. However, once she realized that engineering was her calling, they fully supported her. Interestingly, her younger brothers are following in her footsteps – one is already at RPI in New York, studying civil engineering, and the youngest is still in high school, but may follow her to Georgia Southern to study civil engineering as well.

Dardano has completed four summer internships in engineering – one at Kimberly-Clark and three at Hanes. The first was at a Kimberly-Clark manufacturing site while she was a junior in high school. She shadowed biomass boilers that converted woodchips to energy and studied the production of paper. Dardano’s next internship – at Hanes in San Salvador, was after her freshman college year. The manager asked her to analyze why the sewing machines had so much downtime. Dardano’s research concluded that the composition and weight of different fabrics affected the machines, and therefore specific fabrics should be assigned to specific machines, and maintenance needed to be tailored to the fabrics and their machines as well.

Dardano’s next two internships were at Hanes as well. The next one, after her sophomore year, was at HQ in Winston-Salem, NC, working with the Engineering Facilities team. She worked one-on-one with a Hanes engineer to develop an automated material handling system for all their facilities (100+ around the world) to generate energy from waste from their manufacturing plants. Her last internship, this past summer, was virtual, also hosted at the Winston-Salem HQ, but involved a diverse team of students – different races, different majors, different ages from high school on up, from engineering to fashion. Their project was to develop an eco-friendly alternative to plastic packaging, and the team worked to use manufacturing waste from the factory floors to create an online prototype.

Meanwhile, back at Georgia Southern, Dardano has been working for the last 18 months or more on a project with Dr. Aniruddha Mitra on a project analyzing the effects of nanoparticles on the health of workers in welding shops, construction shops, gyms, etc. The project combines her engineering technical skills and interest in biology and health. It has also become vastly more relevant with the spread of COVID-19, especially as Dr. Mitra and she were already researching the filtration of the nanoparticles using the now very popular N95 masks. Be sure to visit her 2021 Student Research Symposium project to see the results of their research.

Pr Fa Tw Ac

Posted in Progress

< Previous

Next >

Allen E. Paulson College of Engineering and Computing • P.O. Box 7995 • Statesboro, Georgia 30460 • 912-478-7412 • engrcomp@georgiasouthern.edu

About the College
Curriculum
Faculty & Staff
Students
Giving

Apply Now

Apply Undergraduate

Apply Graduate

Georgia Southern College of Engineering Partnership Success Story

March 17, 2021

When Lee Brandon, a successful inventor, and creator of the patented AB-Inforcer® core biofeedback and spine stabilization training system, wanted to make strategic improvements to her internationally acclaimed system, she approached the Allen E. Paulson College of Engineering and Computing at Georgia Southern University for help.

A highly accomplished athletic coach and innovator, Brandon was the first female Assistant Strength Coach to work in the NFL and is a four-time U.S. Olympic coach and a two-time World Long Drive Champion. This established California resident discovered the engineering resources at Georgia Southern while visiting her mother, a major Eagles fan, in Claxton.

“Working with Georgia Southern is a way to honor my mom,” she explains. “I love collaborative work and paying it forward. This has been a magnificent, divinely

inspired partnership."

Brandon knew she wanted to re-engineer the AB-Inforcer®, which is currently used by the Atlanta Falcons and by numerous collegiate and professional sports teams around the world. Her goal is to re-launch her invention as the AB-Inforcer® II after making forward-thinking advancements and upgrades to the overall design and functionality of the product.

"I trust the team at Georgia Southern," she says. "They're asking great questions and the faculty and the students are brilliant. We're poised to do some great things. It's an exciting process to forge and pioneer a new path."

Dr. Fernando Rios-Gutierrez, associate professor in the Department of Electrical and Computer Engineering, enjoys the multi-disciplinary nature of the AB-Inforcer® project, which unites experts in various engineering and computer science fields.

"The best part of working on a project like the AB-Inforcer® at Georgia Southern is that each part of the device that includes electronics, programming and mechanical systems can be designed and implemented independently by a different team of students and faculty that are experts on each of these areas," he explains. "Having projects in the university that are associated with private companies is good for both institutions because both get benefits from this collaboration. Companies get improved products, and the university gets to work in the development of state- of-the-art products."

Brandon invented the AB-Inforcer® after sustaining a life-altering sports injury at the age of 17.

"I was motor-challenged and lost everything," she recalls. "I was struggling just to get my hand to work again. I taught my body to feel again using Biofeedback Flooding and kinesthetic awareness 25 years before its benefits were documented in clinical studies."

After recovering from her catastrophic injury, she realized she needed to pay it forward and to help others. Brandon eventually invented the AB-Inforcer® which she describes as "a musical instrument for the spine" that teaches the body to engage the core muscles properly in order to support the spine and ultimately performance.

"Lee came to us wanting to know if the Computer Science department could help her move this technology forward," said Dr. Andrew Allen, Assistant Professor of Computer Science. "She came to us with quite a few insights and wanted to see if we could make the device wireless."

The Computer Science department built several wireless prototypes, which were based on the current remote-control design, but with new functionality, including the ability for professionals – including physical therapists, chiropractors, strength coaches and personal trainers — to objectively take notes and track client progress electronically. The idea was to give professionals more tools to track and analyze client data. The Electrical Engineering department is currently examining the

interface between device sensors and data as part of a one-year project.

Georgia Southern faculty and students are also working to develop an AB-Inforcer® mobile app and to create a cloud-based database to store data for trainers. Dr. Allen even gave Computer Science students in a senior-level capstone course the opportunity to brainstorm and provide ideas and solutions for the AB-Inforcer project.

For Lauren Potts, an Electrical Engineering senior at Georgia Southern, helping to optimize the AB-Inforcer® II has been a highlight of her academic experience at the university.

“My favorite part about working on this project is being able to make an immediate impact with an industry product,” she says. “Upon completion of this project, the AB-Inforcer® II should be ready to market as a re-branded product. It is very fulfilling knowing that our work will be readily available to professionals and consumers and be able to provide a positive impact in their lives.”

Brandon appreciates the hard work of faculty and students who are working together to re- design the electronics of the device, including the manual controller, the sensors and the data collection system. She believes other companies could benefit from partnering with Georgia Southern for product development, innovation and creative solutions.

“I’ve met with many universities, and I believe the potential at Georgia Southern is incredible,” Brandon raves. “The Allen E. Paulson College of Engineering and Computing is an untapped gem for business owners and inventors who want to take their product to a higher level.”

About the College
Curriculum
Faculty & Staff
Students
Giving

Apply Now

Apply Undergraduate

Apply Graduate

Liz Majestic, BS MechE '13

March 17, 2021

Liz Majestic, one of the first female B.S. in Mechanical Engineering graduates from Georgia Southern, loves a challenge. Even as an undergrad, she says her favorite professor was tough. "Dr. [Aniruddha] Mitra was a challenging professor but in a good way. He would help you, but you had to ask. The tests he made were hard and sometimes impossible, but he gave credit where it counted, which was the work shown. His expectations and classes helped prepare you for what an engineering job is going to throw at you."

Now, as a Product Manager at Yokogawa Corporation of America in the Atlanta area, she loves the challenges and unique applications that the team she works with needs to solve. Majestic's job requires her to interact with all the departments at the company, and she loves analyzing the market trends and learning what products work for a customer's specific application. She also has found that the concepts and theories she learned at Georgia Southern greatly influence her job daily. For instance, one of the product lines Majestic manages is a vortex flow meter which uses the Von Kármán effect to measure the rate of flow of a fluid or gas – she

learned that concept in Fluid Dynamics (ENGR 3235).

Majestic credits her lab classes with teaching her the teamwork – collaboration and communication skills – necessary to getting her work done correctly. And she makes sure that other students gain the benefit of her experience by talking with her co-op students at Yokogawa.

Majestic and her husband live on a small farm, where they are working from home. They are thankful that they have both survived having COVID-19, and to celebrate they both got COVID puppies. Majestic also has horses, and she and her husband enjoy building items to help them around the farm. Like Trammell, Majestic also plans to continue her education, probably with an MS in Engineering Management and/or an MBA.

About the College
Curriculum
Faculty & Staff
Students
Giving

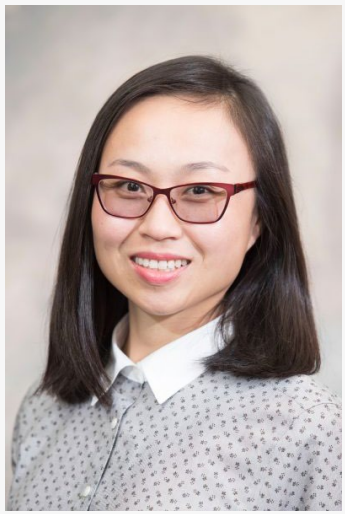
Apply Now

Apply Undergraduate

Apply Graduate

JingJing Qing, Assistant Professor, Manufacturing Engineering, Studies in Metallurgy

March 18, 2021



Jingjing Qing came to Georgia Southern from the Materials Research Center at Missouri University of Science and Technology. She is a metallurgist with expertise in cast iron solidification, ferrous metallography, and materials characterization using electron microscopies. An assistant professor in the Department of Manufacturing Engineering, Dr. Qing is married to and collaborates in her research with Mingzhi Xu, assistant professor in the Department of Mechanical Engineering at Georgia Southern. Together, they have established a Georgia Southern student chapter of the American Foundry Society (AFS) and a lab in the new Engineering and Research Building.

Even before making her way to Georgia Southern, Qing won research funding from several manufacturing companies such as Spirit Aerosystems, Caterpillar, Nucor Steel, North American Stainless Steel; and the Ductile Iron Society. She also published in high-impact journals and won two AFS Best Paper Awards. Qing and Xu continue to impress at Georgia Southern in their publications, external research funding – and in receiving the prestigious AFS Howard F. Taylor Award, to recognize the paper presented at the 2020 Metalcasting Congress that has the greatest long-

range technical significance in the field of cast metals technology: "*Structure of Spheroidal Graphite Nuclei and Spheroidizing Mechanism of Graphite in Mg-Treated Ductile Iron.*"

In this research, funded by Ductile Iron Society, atom probe tomography (APT) with high sensitivity and spatial resolution was applied to study the elemental distributions in graphite to better understand spheroidization of graphite in the ductile irons. Compositional analysis was performed at the graphite/matrix interface and graphite/nuclei interface using APT and energy dispersive X-ray (EDX). Distributions of various alloying elements at interfaces were obtained. Compositional gradients were observed at both the graphite/liquid interface and the graphite/nuclei interface. The graphite/nuclei interface was shown to be semi-coherent/incoherent using the transmission electron microscopy, with a high density of crystallographic defects and high curvatures in the graphite basal planes growing off the nuclei. Intercalation of large nodulizing elements within and in between the graphite basal planes was proposed to account for the spherical morphology of the graphite in ductile irons.

Another study that received good recognition was on the solidification of ductile irons. Qing performed an interrupted solidification experiment to retain structures at various stages of ductile iron solidifications. Austenite engulfment of spheroidal graphite particles occurred after independent nucleation of the two phases. She used a scanning electron microscopy (SEM) equipped with EDX and Auto Feature Analysis (AFA) software to perform the statistical analysis on size, morphology and distribution of the graphite particles to advance the understanding of graphite growth kinetics. The spheroidal graphite particles were extracted, and their growth features revealed the staged growth mechanism of the spheroidal graphite particles in the ductile iron. Thin film specimens of ~100nm thick were extracted from the spheroidal graphite particles for internal structure examinations using the Transmission Electron Microscopy (TEM). Crystal structure of the graphite was characterized based on the diffraction patterns. The curvature accommodation models with various crystallographic defects in the spheroidal graphite particle were generated in this study.

Another recently funded research was to advance the theory of nucleation of spheroidal graphite in the ductile iron. Qing used high resolution TEM to study the elemental distribution, crystal structure, and interface coherency of complex nuclei made of different compounds in spheroidal graphite. The spheroidal graphite nuclei were differentiated as the complex compound was made of oxide, nitride and sulfide. Atomic resolution images at various interfaces clearly displayed the highly defective graphite crystal structures. Thermodynamic calculations were successfully applied to understand the formation sequence of the different compounds in the complex nuclei. Nanoparticles of complex chemistry as the transition products were observed, which may contribute to the curvature accommodation of the graphite basal planes. The instability of these transition compounds can explain the inoculation fade phenomenon during the cast iron productions.

In a project collaborated with Spirit AeroSystems, Qing studied the solid silver embrittlement of the Ti 6-2-4-2 alloy. Experiments were conducted to track the lifetime of Ti 6-2-4-2 specimens subjected to various levels of tensile load at different elevated service temperatures when silver was in contact with the specimens. Effects of the contact pressure between silver and Ti alloy was evaluated. Interannual fracture characteristics near the Ag contact area in the Ti alloy was revealed with the SEM, indicating decohesion of the grain boundaries. Microvoids observed in the area away from silver contact side on the fracture surface indicate ductile failure of the alloy. Silver was found on the fracture surface primarily due to the diffusion of silver along the grain boundary.

Qing is currently collaborating with Duramatic Products to optimize the Austenite tempering process for manufacturing lawn mower blades.

About the College
Curriculum
Faculty & Staff
Students
Giving

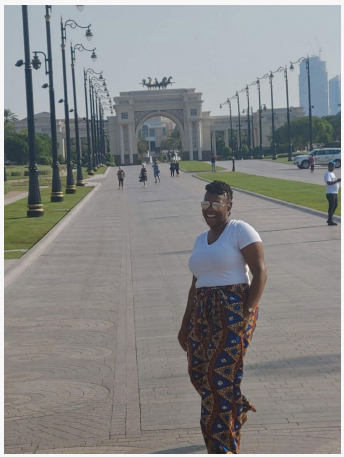
Apply Now

Apply Undergraduate

Apply Graduate

Sade Trammell, BSCE '13

March 18, 2021



Like many engineers, Sade Trammell loves learning. Even now, more than seven years after graduating from Georgia Southern's first Civil Engineering cohort, she "reads" all the time via Audible®. This works well in her current job with Norfolk Southern as Supervisor of Track Inspections, which involves a lot of driving, so she can listen to, for instance, Michelle Obama's memoir "Becoming," while she's cruising along the roads and railroad tracks from job site to job site.

Another kind of life-long learning Trammell enjoys is travel. She has been to several areas of the Caribbean, including Cancun, the Dominican Republic, Jamaica and the Bahamas – but her favorite excursion took her further afield. In 2019 she and a friend toured Dubai, Amsterdam and Paris. "I really love getting to know about other cultures and exploring new foods," Trammell enthused.

Originally from Atlanta, Trammell is a first-generation college student. She also held down two jobs while attending Georgia Southern, so she had to learn how to "adult" very quickly, especially how to keep up with her budget and a full schedule of classes. Trammell is the first female to graduate from the new B.S. in Civil Engineering program, which grew out of the B.S. in Civil Engineering Technology program.

GDOT hired Trammel upon her graduation straight into management as a construction project manager. Trammell enjoys management, working outside, learning and collaborating with her peers to put the end results together. She credits Georgia Southern with providing her with insight into things she sees and goes through in the field. “I still have to learn a lot of new things, but Georgia Southern taught me how to study and learn. It also taught me how to be dedicated to accomplishing my assignments.” What’s next for Trammell? She wants to continue to expand her horizons, perhaps get her master’s degree in structural or architectural engineering. And, when the pandemic is over, you may cross her path in some exotic location somewhere in the world.

About the College
Curriculum
Faculty & Staff
Students
Giving

Apply Now

Apply Undergraduate

Apply Graduate

Lixin Li, Professor, Computer Science, Spatiotemporal Interpolation Methods

March 18, 2021

Dr. Lixin Li is a tenured full professor in the Department of Computer Science at Georgia Southern. She started at Georgia Southern immediately upon receiving her Ph.D. degree in Computer Science from the University of Nebraska-Lincoln in 2003. Dr. Li is married to Dr. Reinhard Piltner, who also works at Georgia Southern. They have two daughters of whom they are very proud.

Dr. Li's research focuses on spatiotemporal interpolation methods, air pollution, GIS (Geographic Information System) applications and machine learning. As human population increases, so do human needs and demands for various resources for their survival. However, this leads to an increase in the amounts of pollutants in our environment that affect the health of more and more people. Dr. Li's research mainly focuses on assessing the trend of various air pollutants using spatiotemporal interpolation algorithms with efficacy and efficiency so that relationships between public health outcomes and spatiotemporally interpolated environmental air pollution values can be evaluated. In particular, her research addresses these challenges by integrating space and time simultaneously in order to achieve better spatiotemporal interpolation accuracy, as well as developing efficient interpolation algorithms that can be applied over a large

geographic area. In recent years, she has collaborated with other researchers in public health, computer science and GIS. They combined spatiotemporal interpolation methods with several machine learning methods.

Dr. Li has 57 peer reviewed journal articles, book chapters, and conference papers, and has given 50 conference presentations and invited talks. In 2020, Dr. Li also published a book titled Spatiotemporal Analysis of Air Pollution and Its Application in Public Health, published by Elsevier. Based on the OCLC WorldCat's statistics on March 15, 2021, 578 academic libraries in more than 30 countries have collected her book, including Stanford University, University of California Berkeley, University of Chicago, Purdue University, New York University, University of Texas at Austin, University of Toronto, University of Illinois at Urbana-Champaign, Peking University, etc.

In addition to working at Georgia Southern, Dr. Li was invited by Friedrich-Alexander University of Erlangen-Nürnberg, Germany, as a SAOT Visiting Professor, August 2012 to August 2013. SAOT is a graduate school of the German Excellence Initiative, founded by the German Research Foundation (DFG). She visited the Patten Recognition Lab in the Department of Computer Science at the University of Erlangen-Nürnberg and gained invaluable research experience in medical imaging.

Finally, Dr. Li enjoys working with undergraduate and graduate students in research. She has supervised six graduate students and four undergraduate students for research projects in computer science. Many of them have co-authored publications with Dr. Li.

About the College
Curriculum
Faculty & Staff
Students
Giving

Apply Now

Apply Undergraduate

Apply Graduate

Azell Francis, BS MechE '13

March 18, 2021

Azell Francis, BS MechE 2013 Magna cum Laude, with minors in Management and International Studies, Honors Program
MS Applied Engineering 2015, and graduate certificate in Occupational Safety and Environmental Compliance.

If you ever have the good fortune of meeting Azell Francis, you will not soon forget this energetic and engaging double Eagle from Trinidad and Tobago. You will rarely see her without her signature smile, which is amazing because as you can see from her credentials, she keeps herself astoundingly busy. In her undergraduate career at Georgia Southern, Francis not only studied one of the most demanding majors possible – Mechanical Engineering – in the Honors Program, but also tacked on two official minor programs of study.

Francis also participated in the College's Society of Women Engineers (SWE) chapter, serving as president for a year, and reintroduced the DREAMS Fair to increase their outreach to middle school girls to encourage them to pursue a career in engineering. The student SWE chapter invited 30 middle school girls to spend a day with them and their faculty advisor, Dr. Rocio Alba-Flores, on the GS Statesboro campus, participating in hands-on experiments to learn how fun engineering can be.

Francis, was elected as Georgia Southern Student Government Association

president – the first international student ever and the first female since 2009. She created the “Eagles for Eagles” program, a student-led initiative to raise funds for students suffering extreme financial hardships. The Student Advisory Council (SAC), composed of SGA presidents from the 31 University System of Georgia (USG) colleges and universities across the state, awarded Francis the 2015 Regent Willis J. Potts Student Advisory Council Leadership Award.

Francis is currently a full-time Ph.D. student at Georgia Tech, working as a Graduate Research Assistant at USG, and plans to become an energy consultant. She credits many of her professors, with whom she keeps in touch, for offering her opportunities, providing guidance and support, and great instruction. “I always get compliments about the diversity and wealth of experience I bring to the table. I credit Georgia Southern with offering me all the opportunities of a research university, with rigorous coursework, hands-on learning, and a nurturing environment of care. At Georgia Southern, I was not a number. My professors and the university staff knew my name and cared and supported my development.”

Francis also serves now as the President of the Young Alumni Board at Georgia Southern. “Our mission is to create a legacy of engagement and giving within Georgia Southern’s young alumni population. In addition to my service on the Board, I give directly to the College of Engineering & Computing because I have been a fortunate recipient of a stellar education and scholarships from the College, and I am now able to pay it forward. ‘If I have seen further, it is by standing upon the shoulders of giants.’ Wise words by Sir Isaac Newton that I have taken to heart. To put it more colloquially, according to another mentor Russell Keen – ‘If you see a turtle on a pole, you know it didn’t get there alone.’ The moral of it all is that I would not be where I am today without the people at Georgia Southern. It is my honor to give back in any capacity, be it my time, my talent, or my treasure.”

Upcoming Events 2021

March 27	Eagle Preview and virtual tour for accepted students on Gatherly platform (To register click on: **https://discover.georgiasouthern.edu/register/cecmarch27**)
April 2	Virtual tour for accepted students of Paulson College of Engineering & Computing on Gatherly platform (To register click on: **https://discover.georgiasouthern.edu/register/cecapril2**)
April 16	Virtual tour for accepted students of Paulson College of Engineering & Computing on Gatherly platform (To register click on: **https://discover.georgiasouthern.edu/register/cecapril16**)
April 23	College Corporate Advisory Committee meeting College Virtual Student Research Symposium (**https://cec.georgiasouthern.edu/our/symposium/**)
May 8	10am, Savannah Convention Center – Commencement Ceremony for students from colleges including the Paulson College of Engineering & Computing
May 12	9am, Paulson Stadium, Statesboro – Commencement Ceremony for undergraduate students from CBaSS and Paulson College of Engineering & Computing
May 13	9am, Paulson Stadium, Statesboro – Commencement Ceremony for graduate students
Sept 24	proposed date for 2021 PCEC Golf Tournament

Last updated: 3/22/2021

Allen E. Paulson College of Engineering and Computing • P.O. Box 7995 • Statesboro, Georgia 30460 • **912-478-7412** • **engrcomp@georgiasouthern.edu**